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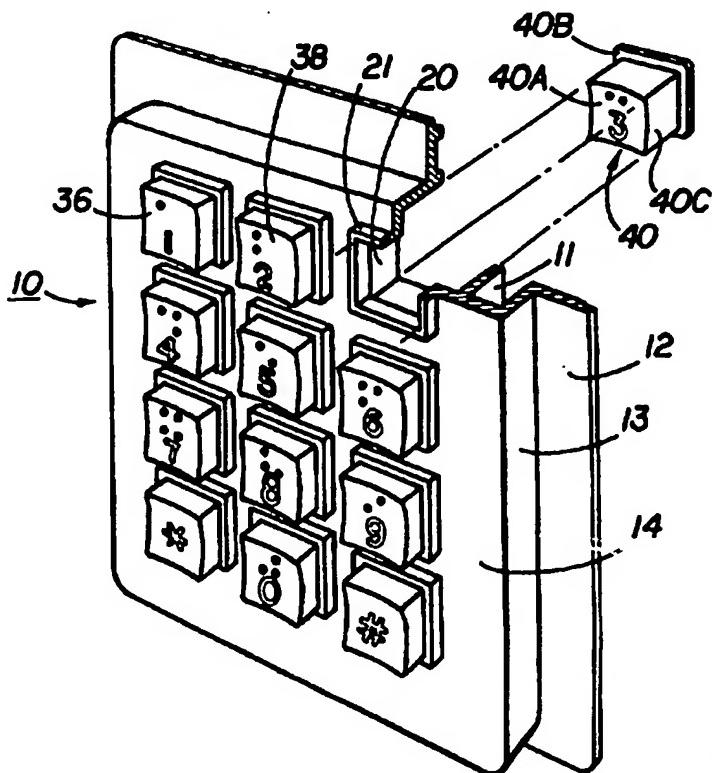
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(54) Title: COIN OPERATED TELEPHONE FEATURING A KEYPAD WITH BRAILLE TACTILE SYMBOLS

(57) Abstract

A telecommunication or computing keypad (10) as shown in the figure is provided with Braille tactile symbols (50) to permit tactile detection and discrimination of information on the keys of the keypad by blind persons. The symbols (50) may be provided directly on the keys, by a casting process or they may be provided in the form of an overlay (80). One such overlay is an elastomeric or other flexible material of a size conforming to an available keypad and having a plurality of projections, each having a recess on its reverse capable of mating with a key of the keypad to which the overlay is sized to conform. In another embodiment of the keypad overlay, the Braille tactile symbols are provided on sheeting or film (126) material having an adhesive backing and sized to conform to the working surfaces of keypad keys.



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COIN OPERATED TELEPHONE FEATURING A KEYPAD WITH BRAILLE TACTILE SYMBOLS

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Field of the Invention

The present invention relates in general to the field of information input devices and in particular to telecommunications equipment keypads.

Background of the Invention

10 Much has been written and promised about the information age and the benefits that are expected to accrue from the rapidly growing field of telecommunications. While the advances in these fields have been and continue to be stupendous, and have actually outpaced optimistic predictions made about them in previous decades, accessibility to these facilities has not
15 necessarily kept pace. In particular, although there are certainly exceptions, technological advances in these areas have tended for the most part to focus on the capacity to manipulate and transport large amounts of information. By contrast, comparatively little attention has been paid to making that information available and useful to such disadvantaged groups as the
20 handicapped. The predominantly visual orientation of the information age, for example, has to a certain extent held the fruits of technological advancement beyond the reach of blind individuals.

Advances in the telecommunications area have created a variety of hitherto unknown services, such as voice mail and sophisticated answering
25 systems that present a series of prompts in response to which a caller or subscriber enters numeric codes, such as responses to queries, passwords and the like. Effective participation in modern daily activities thus increasingly requires the ability to enter such information with reasonable facility, if not rapidity. Nearly everyone who has used a touch tone telephone in recent
30 times has certainly encountered sequential or repeated prompts from an automated answering system that necessitate not merely an able short term

memory, but also appreciable dexterity in selecting entries via the keypad. Blind persons, among others, are burdened by these increasing demands, particularly when confronted with a keypad of the sort found on public telephones. These are ill-equipped to accommodate a blind person's special 5 needs. Plainly, a growing yet unmet need exists for lifting, at least in part, the onus borne by the blind in interfacing with modern telecommunications facilities using conventional input keypads.

Summary of the Invention

- 10 The present invention overcomes certain difficulties of existing telecommunications equipment by providing devices for permitting the use of a keypad on the basis of tactile sensation. The devices are for use with a keypad having a plurality of keys, each key bearing a symbol, the devices generally comprising a plurality of three dimensional Braille tactile symbols.
- 15 Each Braille tactile symbol is coupled to a corresponding keypad key and provides information from which the symbol on the corresponding key can be inferred by tactile means.

In one embodiment of the present invention, an overlay template is provided for use with an existing keypad having a plurality of keys. The 20 overlay template includes a membrane having a mating surface for mating to the keypad, and a working surface opposite the mating surface. The mating surface of the membrane has a plurality of recesses, each recess corresponding to one of the keys of the keypad. The working surface of the membrane has a plurality of projections, each of which projections corresponds to and is on the opposite side of the membrane from a recess. A 25 plurality of three dimensional Braille tactile symbols is provided, each of which is coupled to the working surface of the membrane at a corresponding projection. The keypad having the described overlay is thus adapted for use by tactile means.

In another embodiment of the invention, a system for identifying keys of a keypad according to tactile cues includes a plurality of substantially flat members, each having a mating surface and a working surface opposite the mating surface. Each mating surface of the substantially flat members is adapted to be affixed to a corresponding keypad key. Each working surface has a three dimensional Braille tactile symbol coupled to it for providing information from which the symbol on the corresponding key can be inferred.

5 In yet another embodiment of the present invention, a telephone 10 having conventional telephonic circuitry is provided. The telephone includes a housing for containing the telephone circuitry, a handset linked to the telephone circuitry via the housing and permitting communications to and from the user. The telephone further includes a keypad having a plurality of keys, each key being associated with a numeral. The keypad further includes 15 a plurality of three dimensional Braille tactile symbols, each Braille tactile symbol being coupled to a key. The Braille tactile symbols enable a user, based on tactile sensing, to obtain information from which the numeral associated with that key can be inferred.

Accordingly, it is an object of the present invention to provide means 20 to enable a user, such as a blind individual, to identify the keys of a telecommunications keypad based on information gained from tactile cues.

It is another object of the present invention to provide a device for adapting or converting an existing telecommunications keypad to a form in which a person can identify the keys of a telecommunications keypad based 25 on tactile cues.

It is still another object of the present invention to provide devices as described above that do not obscure printed or other visually discernible symbols on the keys of a keypad.

It is yet another object of the present invention to provide a device for 30 adapting or converting an existing telecommunications keypad to a form in

which a person can identify the keys of a telecommunications keypad based on tactile cues, and in which the device is a unitary membrane template capable of being mated to a keypad, by retrofit or otherwise, and that is transparent to permit the visual detection and identification of printed or
5 other symbols on the keys.

It is a still further object of the present invention to provide a device for adapting or converting an existing telecommunications keypad to a form in which a person can identify the keys of a telecommunications keypad based on tactile cues, and in which the device is a plurality of substantially
10 flat, and preferably transparent members, each having a Braille tactile symbol and adapted to be joined to a keypad key.

Brief Description of the Drawings

Figure 1 is a perspective view of a keypad according to the present
15 invention, in partial section, and partially exploded to show the relationship between a representative key and the remainder of the keypad.

Figure 1A shows a perspective view of a first public telephone having a keypad according to the present invention, the handset of the public telephone being partially cut-away to show the keypad.

20 Figure 1B shows a perspective view of a second public telephone having a keypad according to the present invention, the handset of the public telephone being partially cut-away to show the keypad.

Figure 2 is a fragmentary elevational view of the keypad of Figure 1, focusing on the representative key and contiguous portions of the keypad.

25 Figure 3 is sectional plan view of the subset of the keypad shown in Figure 2, taken through line 3-3.

Figure 4 is an exploded perspective view of a keypad membrane overlay according to the present invention, and a keypad on which the membrane overlay is to be placed.

Figure 5 is an elevational view of the keypad membrane overlay shown in Figure 4 disposed on the associated keypad.

Figure 6 is a sectional plan view of the keypad and keypad overlay shown in Figure 6, taken through line 6-6, as viewed from below the keypad
5 and overlay.

Figure 7 is a sectional plan view of an alternative embodiment of a keypad overlay, disposed on keypad 10, taken through a line analogous to line 6-6, as viewed from below the keypad and overlay.

Figure 8 is an exploded perspective view of individual keypad key
10 overlays, and a keypad on which the key overlays are to be placed.

Detailed Description

An embodiment of a keypad 10 according to the present invention is shown in Figure 1. Keypad 10 and the other keypads embodying the
15 invention described herein may be used in any communication or computation application, but are particularly useful in the telecommunications context and will, accordingly, be described in that setting. In the view shown in Figure 1, keypad 10 includes a keypad plate or bezel 11 having a rectangular flange 12 for mounting the keypad to a telephone or other device (not shown). Set in from the edge of the
20 rectangular flange 12 and running perpendicularly to the interior perimeter of rectangular flange 12 is a wall 13. Wall 13 forms a rectangular support for faceplate 14, to which it is joined flush at the edges. Preferably, although without limitation, rectangular flange 12, wall 13 and faceplate 14 of bezel
25 11 are an integral unit that may be formed by casting, for example.

Faceplate 14 includes a plurality of penetrations or apertures of which a single aperture 20 is visible in this partially sectional and exploded view. For clarity and succinctness of explanation, reference will be made primarily to the partially sectioned and exploded portion of the device. The apertures,
30 like aperture 20, are preferably square and bordered by a peripheral lip

having a structure like that of lip 21 corresponding to aperture 20 and a height of about 1.52 mm. Each aperture and peripheral lip form a guide for a corresponding key to facilitate smooth reciprocating motion of the key when pressed and released. For example, aperture 20 and peripheral lip 21 form a 5 guide for key 40, representative of the keys of keypad 10.

The keys of keypad 10, of which key 40 is representative, each include a working surface, such as working surface 40A of key 40, a rectangular flange such as 40B, and a side wall such as 40C joining each working surface to each rectangular flange. The rectangular flanges of the 10 apertures like aperture 20 provide a stop that limits the range of keys, such as key 40.

The anatomy and operation of the keys of keypad 10, of which key 40 is representative, can be understood by further reference to Figures 1, 2 and 3. Shown in the exploded sectional portion of the view of Figure 1, key 40 15 occupies the position associated in conventional telephones with the number 3. Preferably, although without limitation, the dimensions of key 40 are as follows: The overall height of key 40, measured from the bottom of its rectangular flange 40B to its working surface 40A is about 8.89 mm. The height of key 40, as measured from the top of rectangular flange 40B to the 20 working surface 40A, is about 7.87 mm. The length of an exterior edge of the rectangular flange 40B of key 40 is about 12.446 mm, while the length of an interior edge of rectangular flange 40B is about 9.398 mm. A key having the above dimensions can be expected to function with public telephones and conventional bezels having standard dimensions.

25 In addition to the foregoing dimensions, key 40 also is provided with a concave working surface 40A, to ergonomically accommodate a human fingertip. The curvature of the working surface 40A should be spherical with radius of curvature approximately equal to 44.75 mm.

The keys of keypad 10, as represented by key 40A, can be of any 30 suitable material and can be formed by casting. They are preferably although

without limitation provided with a high quality finish suitable for electroplating with matte chrome of 0.05 mil (1.27 mm).

To permit or facilitate the use of keypad 10 by blind persons, the working surfaces of each key, such as working surface 40A of key 40, are

5 provided with at least one Braille tactile symbol 50 corresponding to the key's position in keypad 10. The Braille tactile symbol or symbols on the keys, for example Braille tactile symbol 50, are raised in low relief so as to be three dimensional and thus permit tactile detection, discrimination and identification of the symbol. Each raised, three-dimensional Braille tactile

10 symbol is placed on a preselected key such that what is signified by the Braille tactile symbol corresponds to the non-Braille symbol or symbols on that key, such as symbol or numeral 56 of key 40. In the embodiment depicted in the Figures, a single Braille tactile symbol is provided for each key. It is also possible according to the invention to provide more than one

15 such symbol as desired.

The Braille system was devised in the 19th century by the French musician, educator and inventor Louis Braille to provide symbols corresponding to the Roman alphabet, the arabic numerals, and certain punctuation symbols commonly used in most western Indo-European languages. The Braille system employs a cell having six positions arranged essentially as they are on a die, i.e., having two vertical columns of three rows. These positions are numbered beginning with 1 from the top to the bottom of the left row, and then from the top to the bottom of the right row. Permutations of raised, three dimensional dots in the six positions are

20 mapped to the desired symbols according to an established convention. For example: the presence of a dot in position 1 (and only in position 1) signifies a lowercase Roman "a"; the presence of a first dot in position 1 and a second dot in position 2 signifies a lower case Roman b; the presence of dots in positions 1 and 4 signifies a lowercase Roman "c". Thus, according to the

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following notation: $a^\circ(1)$, $b^\circ(1, 2)$, $c^\circ(1, 4)$. . . , the remaining letters of the first ten letters of the Roman alphabet are as follows:

- 5 $d^\circ(1, 4, 5)$;
 $e^\circ(1, 5)$;
 $f^\circ(1, 2, 4)$;
 $g^\circ(1, 2, 4, 5)$;
 $h^\circ(1, 2, 5)$;
 $i^\circ(2, 4)$;
10 $j^\circ(2, 4, 5)$.

To represent the arabic numerals, the Braille system codes each numeral, beginning with 1 and ending with 0, with the Braille symbol for one of the first ten of the lowercase Roman letters. To indicate that this code symbol is intended to signify a numeral rather than a letter, the Braille 15 system prefixes the letter with a numeral leader or sign. According to the above-adopted notation, the numeral leader or sign is the following: numeral $^\circ(3, 4, 5, 6)$. Thus, the 10 arabic numerals are as follows (where, for convenience of notation, num $^\circ(3, 4, 5, 6)$, and where the symbol "," indicates succession by a Braille symbol):

- 20 $1^\circ\{\text{num}, (1)\}$;
 $2^\circ\{\text{num}, (1, 2)\}$;
 $3^\circ\{\text{num}, (1, 4)\}$;
 $4^\circ\{\text{num}, (1, 4, 5)\}$;
25 $5^\circ\{\text{num}, (1, 5)\}$;
 $6^\circ\{\text{num}, (1, 2, 4)\}$;
 $7^\circ\{\text{num}, (1, 2, 4, 5)\}$;
 $8^\circ\{\text{num}, (1, 2, 5)\}$;
 $9^\circ\{\text{num}, (2, 4)\}$;
30 $0^\circ\{\text{num}, (2, 4, 5)\}$.

As can be seen in Figure 1, the keys of a conventional keypad are numbered from 1 to 9 beginning with the upper left hand key and progressing first through the columns and then through the rows: 1 ° (1, 1); 2 ° (1, 2); . . . ; 4 ° (2, 1); . . . ; 9 ° (3, 3). Numeral 0 deviates from this pattern,
5 corresponding to the second column of the fourth row.

According to the present invention, the Braille tactile symbol for each of the arabic numerals is provided on the key having the corresponding arabic numeral. In the preferred embodiment of the invention, as shown in the Figures, each Braille numerical symbol is preferably, although not necessarily, provided without the preceding numeral signifier. In other
10 words, the first ten letters of the Roman alphabet as represented in the Braille system are provided, respectively, on the keys having pre-fixed arabic numerals 1-9 and 0.

The Braille tactile symbols may be provided on the keys of the
15 keypad 10 according to any suitable means, so long as the height and diameter of the raised, three dimensional Braille dots is sufficient to provide an effective tactile stimulus for a human fingertip. Preferably, although without limitation, the dots may be 1.0 mm in diameter and raised from the working surfaces of the keys by 1.0 mm. Furthermore, the Braille tactile
20 symbols are preferably, although not necessarily, provided in a preselected half of the working surfaces of the keys, such as the upper half, and occupy a zone of approximately 3.175 mm on a side. In such a configuration, the arabic numerals, such as symbol or numeral 56 of representative key 40, can be provided in the middle of the lower half of the working surfaces of the
25 keys (e.g., working surface 40A of key 40), also preferably, although without limitation, being 3.175 mm in height. The relative positions and dimensions of the Braille and arabic representations can be seen in Figures 2 and 3, which respectively show a detailed fragmentary elevational view and a cross-sectional view of representative key 40.

When fabricated to conform to the described dimensions, keypad assembly 10 can be provided in a conventional public telephone, as shown in Figures 1A and 1B, either during fabrication or by retrofitting. Figure 1A shows the keypad assembly 10 installed in a first type of public telephone 70, such as is manufactured by Western Electric (AT&T). The exterior hardware of public telephone includes a housing 71, to which handset 72 is coupled, and to the front of which keypad 10, having Braille tactile symbols, is also coupled. Figure 1B shows the keypad assembly 10 installed in a second public telephone 75 of a sort manufactured by GTE. Second public telephone 75 includes among its exterior hardware a housing 76, a handset 77 coupled to housing 76, and a keypad 10 having Braille tactile symbols also coupled to housing 76.

A second embodiment of the present invention is shown in Figure 4 having the form of an overlay for a telephone or other keypad. In particular, the keypad overlay structure according to the present invention takes the form of a membrane template 80. Membrane template 80 includes a rectangular flange 82 that preferably is rectangular and of substantially identical dimensions as the faceplate 14 of keypad 10. Furthermore, membrane template 80, having a working surface 84 on one side and a mating surface 86 on the other is provided with a number of projections. Projections protrude from working surface 84 of membrane template 80, and form corresponding recesses as defined with respect to mating surface 86. The description of the projections is limited for purposes of description to the three projections in the top row, identified by reference numerals 88, 90 and 92, which are representative of the others. As can be seen by reference to Figure 4, the dimensions of the projections 88-110 (even) and their positions with respect to the membrane template 80 are preferably preselected to correspond to a keypad to which the membrane template 80 is to be mated. Thus, where the keypad to which the membrane template 80 is to be mated is a keypad 10, having the dimensions described above, the dimensions of

membrane template 80 are selected accordingly so that membrane template 80 can be permanently placed over, mated with and fastened to keypad 10. As membrane template 80 is placed over keypad 10, subsets of the mating surface 86 of the membrane template 80 corresponding to the recesses of the 5 projections is in contact with or is very closely adjacent to a corresponding key of keypad 10. In particular, projection 88 mates with key 36, projection 90 mates with key 38, and projection 92 mates with key 40, and so on. In this way, a user of keypad 10 that has template 80 affixed to it, may locate the appropriate key of keypad 10 by tactile detection of the corresponding 10 working surface of membrane 10, and select the key by pressing that working surface.

Membrane template 80 can be formed from any sufficiently flexible and durable elastomeric or other material, and particularly one that can be made to be transparent and that can be provided, by molding or by other 15 means, with the described raised, three dimensional Braille tactile symbols. The membrane template 80 thus can provide a surface having Braille tactile symbols corresponding to the keys of keypad 10, facilitating use by blind persons, yet also allowing sighted persons to see through to the symbols on keypad 10.

20 Referring to Figure 5, an embodiment of the membrane template 80 according to the present invention is shown having been mated with keypad 10. Membrane template 80, as can be seen, is in this embodiment fabricated to have dimensions complementary with keypad 10. Through the working surfaces of the projections are visible keys of keypad 10 and their 25 numerals on their working surfaces, permitting sighted individuals to use keypad 10 as usual. The rectangular flange 82 of membrane template 80 has outer peripheral dimensions identical to the perimeter of faceplate 14 of keypad 10. Rectangular flange 82 is joined to faceplate 14 using a suitable adhesive material capable of creating a rugged and durable bond between 30 membrane template 80 and keypad 10 that can withstand the rigors of

exposure out of doors to temperature swings and moisture, as well as repeated public use for a period of years. A membrane template 80 of this type, when properly attached, also protects keypad 10 from direct contact with the elements and its internal components from soot, grit and other debris
5 capable of infiltrating the apertures around the edges of the keys.

As an alternative to being sized for coupling to keypad 10, membrane template 80 could be fabricated to have dimensions compatible with other extant keypads, so that such keypads may also be retrofitted with the membrane template 80 and thereby facilitate their use by blind persons.

10 Figure 6 shows the membrane template 80 and keypad 10 in cross section, the section taken along line 6-6 of Figure 5. The projections having the shape of truncated pyramids and their working surfaces, such as working surfaces 88A-92A of projections 88-92, are accordingly joined to rectangular flange 82, and to each other, by a plurality of adjacent sloped walls.

15 Referring particularly to representative projection 92, corresponding to representative key 40, sloped wall 92₄ extends downwardly from working surface 92A to the base of sloped wall 90₂ of adjacent projection 90, where the two walls join. From the opposite edge of working surface 92A, sloped wall 92₂ extends downwardly to and joins rectangular flange 82. As seen by
20 reference to Figure 5, representative projection 92 has two additional walls, sloped wall 92₁ extending downwardly to the top of rectangular flange 82, and sloped wall 92₃ extending from working surface 92A to the base of the sloping wall of the projection immediately adjacent sloped wall 92₃.

Also visible in Figure 6 are the raised, three dimensional Braille
25 tactile symbols of projections 88-92. Projection 92 corresponding to representative key 40 has the two dots or protuberances indicative in the Braille system of the letter "c", or the integer "3" (when the Braille numeral symbol is implied). Projection 90 has the Braille tactile symbol for the letter "b" or the integer "2", and projection 88 corresponding to key 40 has the

Braille tactile symbol for the letter "a" or the integer "1" on its working surface 88A.

Figure 7 shows an alternative embodiment of the keypad overlay according to the present invention. As in Figure 6, membrane template 100 and keypad 10 are shown in cross section as viewed from below, the section taken along a line analogous to line 6-6 of Figure 5. In this embodiment of membrane template 100, working surfaces of the projections are joined to peripheral flange 102, and to each other, by a plurality of accordion-like webs. Referring particularly to representative projection 112, corresponding to representative key 40, web 112₄ extends from working surface 112A to the working surface 110A of adjacent projection 110, and joins that surface. From the opposite edge of working surface 112A, web 112₂ extends downwardly to and joins rectangular flange 102.

Another embodiment of the present invention is shown in Figure 8. In this embodiment, rather than providing the Braille tactile symbols in a unitary overlay that fits over the entire keypad 10, only the working surfaces of the keys are covered. Figure 8 shows this embodiment of the invention in exploded form. Each member of the set of adhesive members corresponds and is joined to a particular member in the set of keys (i.e., excluding the asterisk (*) and pound sign (#) keys). Each of the Braille tactile symbols for the first ten (10) letters of the alphabet or the integers from 0 to 9 (if the Braille numeral symbol is implied) is thus affixed to the corresponding key of keypad 10. Representative adhesive member 130, for example, having the Braille tactile symbol 150 for "c", or for "3" (when the Braille numeral symbol is implied), is designated for application to representative key 40 of keypad 10. Adhesive member 128 is shown as corresponding to key 38 of keypad 10, and has Braille tactile symbol 148 for "b" or "2" (when the Braille numeral symbol is implied), and adhesive member 126 is shown as corresponding to representative key 36, and so on. The remainder of the

adhesive members are analogous to and joined in the same manner as adhesive members 126, 128 and 130.

The adhesive members can be formed from any suitable film, sheeting material, or the like, that can be formed with raised, three dimensional Braille tactile symbols, or which can receive such symbols on their working surfaces. The sheeting should be able to accept on the reverse side an adhesive suitable to permit the joining of the adhesive members to the highly finished, curved surfaces of the keys of keypad 10, and to create a bond that will maintain the adhesive members fast to the corresponding keys for at least an appreciable portion of the design life of the keys themselves.

To permit application of the adhesive members to be applied to existing public telephones that may already be in use, the adhesive should preferably be capable of adhering to surfaces having traces of certain environmental substances such as soot or oils, which may not be entirely removable prior to applying the adhesive members.

As with the membrane templates 80 and 90, the material from which the adhesive members are preferably formed is preferably transparent, so that information on the keys of keypad 10 continue to be visually detectable.

Alternatively, the adhesive members, such as adhesive member 130, can be opaque. If they are opaque, however, each adhesive member should include visually detectable, printed information providing the same information as the key on which the adhesive member is to be placed.

While the present invention has been described with reference to certain embodiments depicted in the accompanying drawings, one of ordinary skill in the art will recognize that other structures may embody the spirit of the invention as described herein and as set forth in the claims.

What is claimed is:

- 1 1. A device for permitting the use of a telecommunications keypad on the basis of tactile sensation, the telecommunications keypad including a plurality of keys, preselected keys of the plurality of keys having a symbol coupled thereto, each symbol signifying an alphanumeric value, the device comprising a plurality of three dimensional Braille tactile symbols, each Braille tactile symbol coupled to a corresponding one of the plurality of preselected keys having a symbol coupled thereto, each Braille tactile symbol signifying an alphanumeric value and providing information from which the alphanumeric symbol on the corresponding key can be inferred by tactile means.
- 1 2. The device of claim 1, in which the symbols coupled to the keys are numerals and the Braille tactile symbols signify numerals corresponding to the key numerals.
- 1 3. The device of claim 1, in which the symbols coupled to the keys are numerals and in which each Braille tactile symbol signifies a letter whose position in the alphabet corresponds to the numeral of the corresponding key, the Braille tactile symbols being Braille numeral symbols that lack a Braille numeral sign.
- 1 4. The device of claim 1, in which each Braille tactile symbol is positioned on the corresponding key at a location above that of the symbol on the key.
- 1 5. The device of claim 1, wherein the Braille tactile symbols are integral with the keys.
- 1 6. The device of claim 1, wherein the Braille tactile symbols are overlaid on the keys.

1 7. The device of claim 6, further comprising a membrane template to which
2 the Braille tactile symbols are coupled and which fits over and mates with
3 the keypad, such that overlaid on each of a plurality of preselected keys of
4 the keypad is a Braille tactile symbol corresponding to the symbol on that
5 key.

1 8. The device of claim 6, further comprising a plurality of adhesive members
2 each having a Braille tactile symbol coupled thereto, each adhesive member
3 coupled to a key of the keypad, such that overlaid on preselected keys of the
4 keypad is a Braille tactile symbol corresponding to the symbol on that key.

1 9. A telecommunications keypad for use with telecommunications
2 equipment and capable of being operated by a user on the basis of tactile
3 sensation, the telecommunications keypad comprising:

4 a bezel having a plurality of apertures therethrough, and
5 adapted to be coupled to the telecommunications equipment;
6 a plurality of keys, each key adapted to be disposed for
7 reciprocating motion in a corresponding aperture of the bezel,
8 preselected keys of the plurality of keys having a symbol coupled
9 thereto, each symbol signifying an alphanumeric value; and
10 a plurality of Braille tactile symbols, each Braille tactile
11 symbol coupled to a corresponding one of the preselected keys
12 having a symbol coupled thereto, each Braille tactile symbol coupled
13 to a preselected key providing information from which the
14 alphanumeric value signified by the symbol coupled to the key can be
15 inferred by tactile means.

1 10. The keypad of claim 9, in which the symbols coupled to the preselected
2 keys are numerals.

1 11. The keypad of claim 10, in which the Braille tactile symbols are numeral
2 symbols signifying values corresponding to the values signified by the key
3 numerals.

1 12. The keypad of claim 11, in which each Braille tactile symbol signifies a
2 letter whose position in the alphabet corresponds to the numeral of the
3 corresponding key, the Braille tactile symbols being Braille numeral symbols
4 that lack a Braille numeral sign.

1 13. The keypad of claim 12, in which the Braille tactile symbol is positioned
2 on the key at a location above that of the key symbol.

1 14. The keypad of claim 12, wherein the Braille tactile symbols are integral
2 with the keys.

1 15. An overlay template for use with a keypad including a plurality of
2 keys having symbols coupled thereto in order to enable use of the keypad
3 using tactile cues, the overlay template comprising:

4 a. a membrane having a mating surface and having a working
5 surface opposite the mating surface;

6 b. the membrane mating surface having a plurality of recesses,
7 each recess corresponding to one of the plurality of keys of the keypad;

8 c. the membrane working surface having a plurality of
9 projections, each projection corresponding to and on the opposite side of the
10 membrane from a recess of the mating surface of the membrane; and

11 d. a plurality of three dimensional Braille tactile symbols, each
12 Braille tactile symbol coupled to the working surface of the membrane at a
13 corresponding projection;

14 whereby the keypad is adapted for use according to tactile cues.

1 16. The overlay template of claim 15, wherein the membrane comprises a
2 material sufficiently transparent that symbols on the keypad over which the
3 membrane is disposed are visible through the membrane.

1 17. The overlay template of claim 15, wherein each of the projections
2 includes a plurality of sloping walls joining the projection to surrounding
3 portions of the membrane.

1 18. The overlay template of claim 15, wherein each of the projections
2 includes a plurality of flexible accordion-like structures joining the
3 projection to surrounding portions of the membrane.

1 19. The device of claim 15, in which the symbols coupled to the keys signify
2 an alphanumeric value.

1 20. The device of claim 16, in which the Braille tactile symbols signify
2 numerals.

1 21. The template of claim 19, in which the symbols coupled to the keys are
2 numerals and the Braille tactile symbols signify numerals corresponding to
3 the key numerals.

1 22. The template of claim 19, in which each Braille tactile symbol signifies a
2 letter whose position in the alphabet corresponds to the numeral of the
3 corresponding key, the Braille tactile symbols being Braille numeral symbols
4 that lack a Braille numeral sign.

1 23. The template of claim 15, in which each Braille tactile symbol is
2 overlaid on the corresponding key at a location above that of the key symbol.

1 24. A system for identifying symbols on keys of a keypad according to
2 tactile cues, comprising:
3 a plurality of substantially flat members each having a mating surface
4 and a working surface opposite the mating surface, each mating surface
5 being adapted to be coupled to a corresponding keypad key, each working
6 surface having a three dimensional Braille tactile symbol coupled thereto,
7 each Braille tactile symbol providing information from which the symbol on
8 the corresponding key can be inferred by tactile means.

1 25. The system of claim 24, wherein the substantially flat members comprise
2 a material sufficiently transparent to permit viewing through the members of
3 the symbols on the keys.

1 26. The system of claim 25 in which preselected keypad keys have a symbol
2 coupled thereto and signifying an alphanumeric value, wherein the Braille
3 tactile symbol corresponding to each preselected key provides information
4 from which the alphanumeric value signified by the symbol coupled to the
5 key can be inferred by tactile means.

1 27. The system of claim 26, in which the key symbols are numerals.

1 28. The system of claim 27, in which the Braille tactile symbols are numeral
2 symbols corresponding to the key numerals.

1 29. The system of claim 27, in which each Braille tactile symbol signifies a
2 letter whose position in the alphabet corresponds to the numeral of the
3 corresponding key, the Braille tactile symbols being Braille numeral symbols
4 that lack a Braille numeral sign.

1 30. The system of claim 27, in which the Braille tactile symbol on each
2 member is positioned on the key at a location above that of the key numeral.

- 1 31. A telephone capable of being operated by a user on the basis of tactile
- 2 sensations, the telephone containing conventional telephonic circuitry and
- 3 comprising:
 - 4 a housing in which the telephonic circuitry is housed;
 - 5 a handset coupled to the telephonic circuitry and to the housing for
 - 6 carrying communications from and to the user;
 - 7 a keypad coupled to the telephonic circuitry and to the housing for
 - 8 permitting entry of information by the user, the keypad including:
 - 9 a plurality of keys, each key associated with a numeral;
 - 10 a plurality of three dimensional Braille tactile symbols, each
 - 11 Braille tactile symbol coupled to a key, for enabling a user
 - 12 based on tactile sensing to obtain information from which the
 - 13 numeral associated with that key can be inferred.
- 1 32. A coin operated telephone which permits a blind user to operate the
- 2 telephone in interactive sessions on the basis of auditory information heard in
- 3 a handset of the telephone, tactile information received by the user from a
- 4 keypad of the telephone and input information input by the user into the
- 5 keypad, which telephone contains telephonic circuitry for receiving the input
- 6 signals from the keypad and for sending auditory signals to the handset, the
- 7 telephone comprising:
 - 8 a. a housing in which the telephonic circuitry is contained and
 - 9 which contains structure for receiving coins;
 - 10 b. a handset connected to the housing via media for sending the
 - 11 auditory signals to the handset for reception by the user;
 - 12 c. a bezel attached to the telephone, the bezel containing a
 - 13 plurality of apertures, each of which is dimensioned to receive a key;
 - 14 d. a plurality of keys, each key disposed for sliding reciprocating
 - 15 motion in a corresponding aperture of the bezel, so as to provide the user

16 with specific tactile information indicated by sliding the key relative to the
17 bezel that the key has been actuated to input information to the telephonic
18 circuitry, at least of a portion of said keys bearing an alphanumeric symbol;
19 and

20 e. a plurality of Braille tactile symbols, each Braille tactile
21 symbol coupled to a predetermined key which bears an alphanumeric symbol
22 that corresponds to the Braille tactile symbol, each Braille symbol therefore
23 adapted to indicate to the user, in combination with the specific tactile
24 information indicated by sliding of the key relative to the bezel, in an
25 ascertainable manner that the information which corresponds to the Braille
26 tactile symbol has been input to the telephonic circuitry of the telephone.

1 33. A coin operated telephone which permits a blind user to operate the
2 telephone in interactive sessions on the basis of auditory information heard in
3 a handset of the telephone, tactile information received by the user from a
4 keypad of the telephone, and input information input by the user into the
5 keypad, which telephone contains telephonic circuitry for receiving the input
6 signals from the keypad and for sending signals to the handset, the telephone
7 comprising:

8 a. a housing in which the telephonic circuitry is contained and
9 which contains structure for receiving coins;
10 b. a handset connected to the housing via media for sending the
11 auditory signals to the handset for reception by the user;
12 c. a bezel attached to the telephone, the bezel containing a
13 plurality of apertures, each of which is dimensioned to receive a key;
14 d. a plurality of keys, each key disposed for sliding reciprocating
15 motion in a corresponding aperture of the bezel, so as to provide the user
16 with specific tactile information indicated by sliding of the key relative to the
17 bezel that the key has been actuated to input information to the telephonic

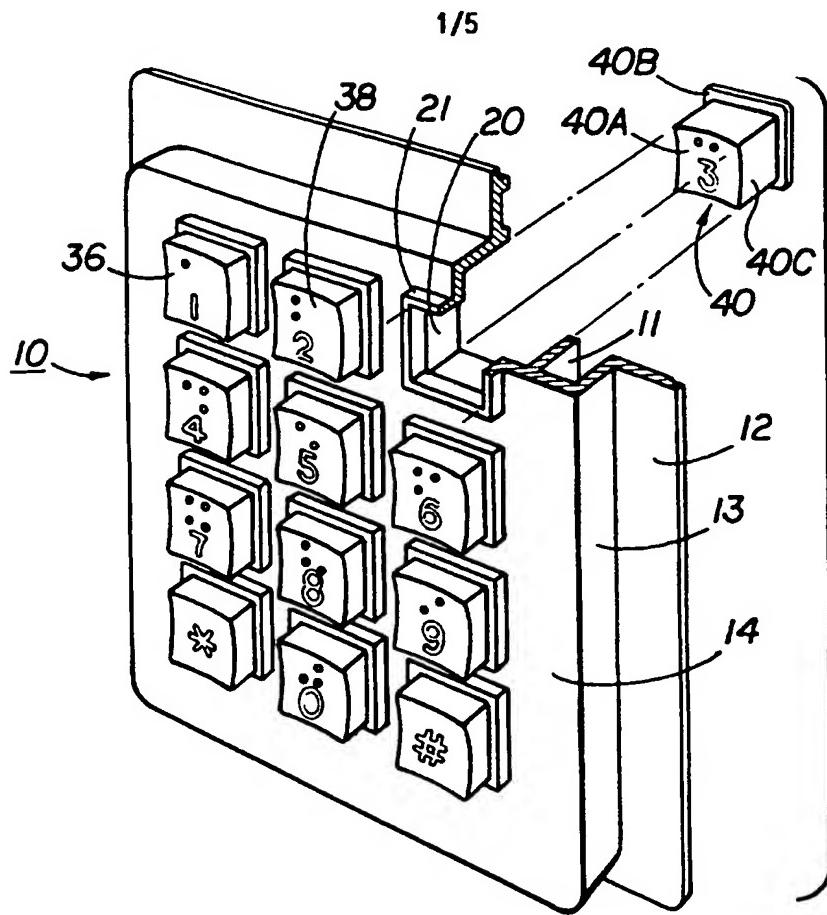
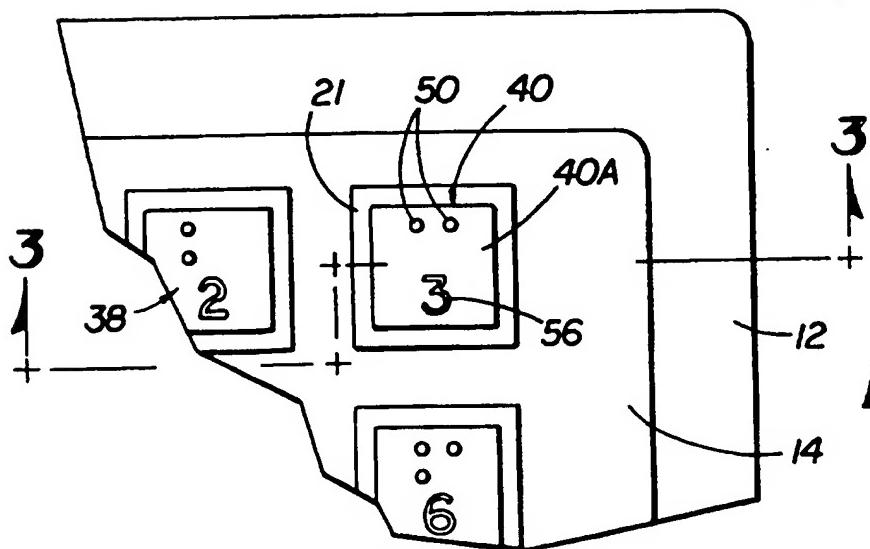
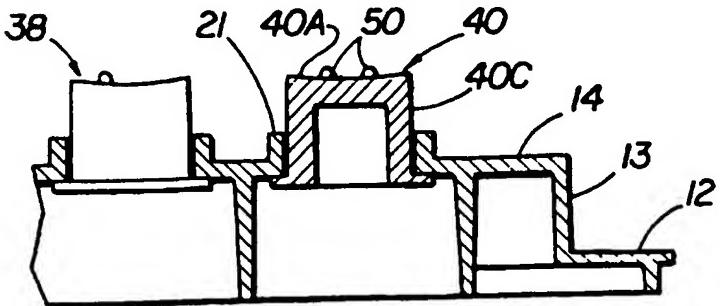
18 circuitry, at least of a portion of said keys bearing an alphanumeric symbol;

19 and

20 e. an overlay template for use with the keypad, the overlay
21 template comprising:

22 1. an at least partially transparent membrane which
23 comprises a mating surface which is attached to the keypad and in
24 which in turn comprises a plurality of recesses to receive at least
25 portions of the keys, and a working surface opposite the mating
26 surface;

27 2. the membrane working surface comprising a plurality
28 of projections, each corresponding to a recess on the mating surface,
29 at least some of the projections in turn comprising a Braille tactile
30 symbol, the Braille tactile symbol on the projection corresponding to
31 the alphanumeric symbol borne on the key which is received in the
32 recess of the membrane corresponding to the projection, so that the
33 alphanumeric symbol can be seen by non-blind users.

**FIG 1****FIG 2****FIG 3**

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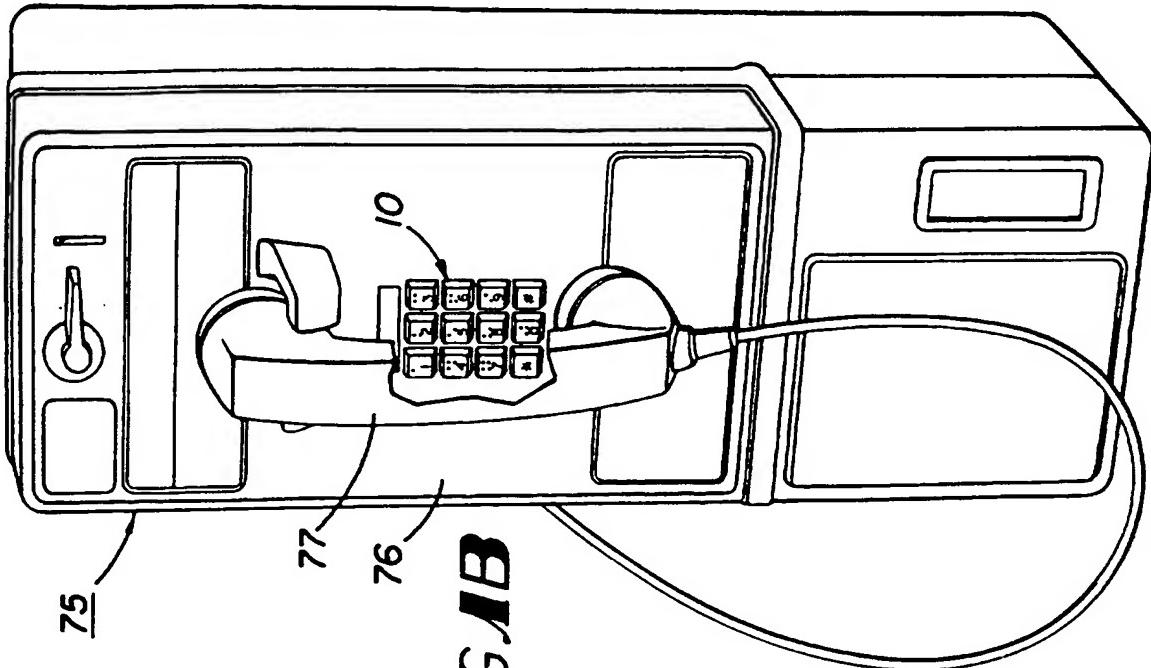


FIG. 1B

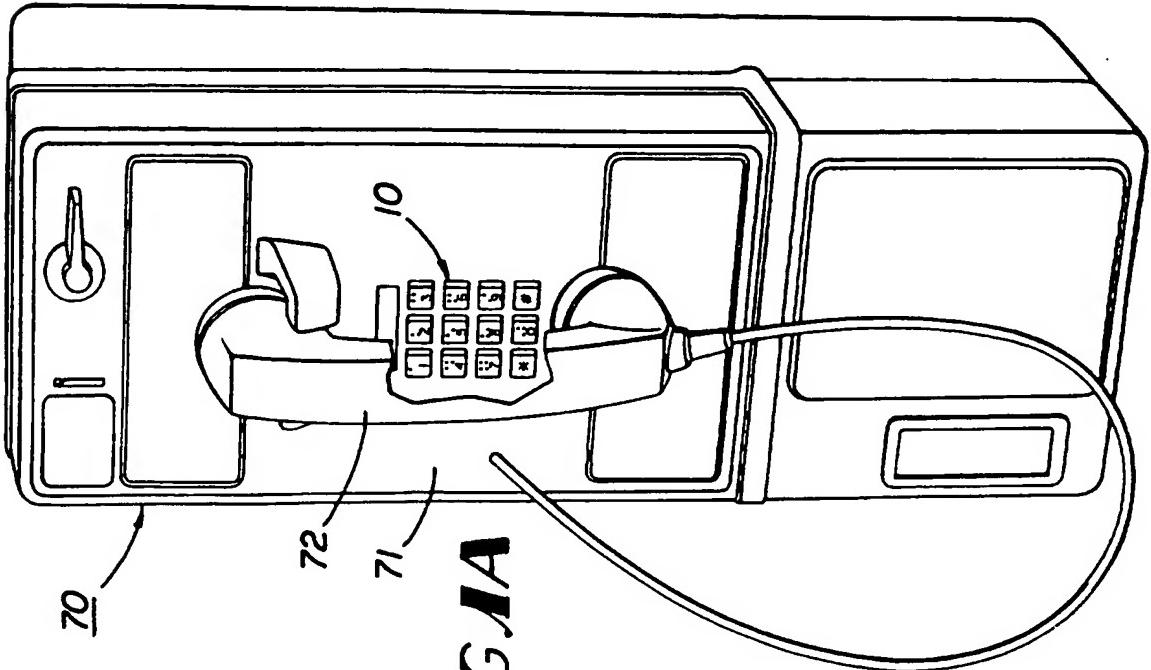
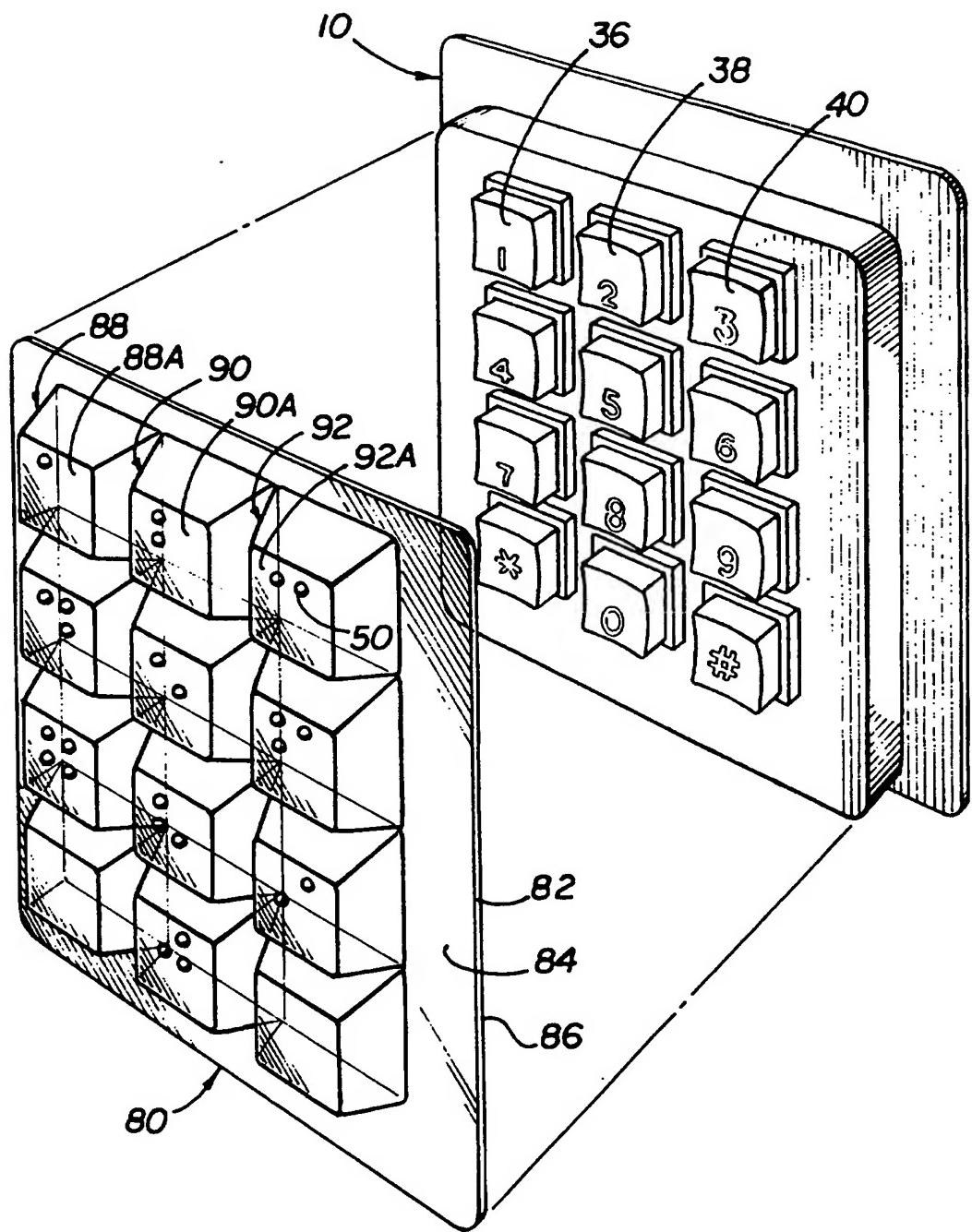


FIG. 1A

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**FIG 4**

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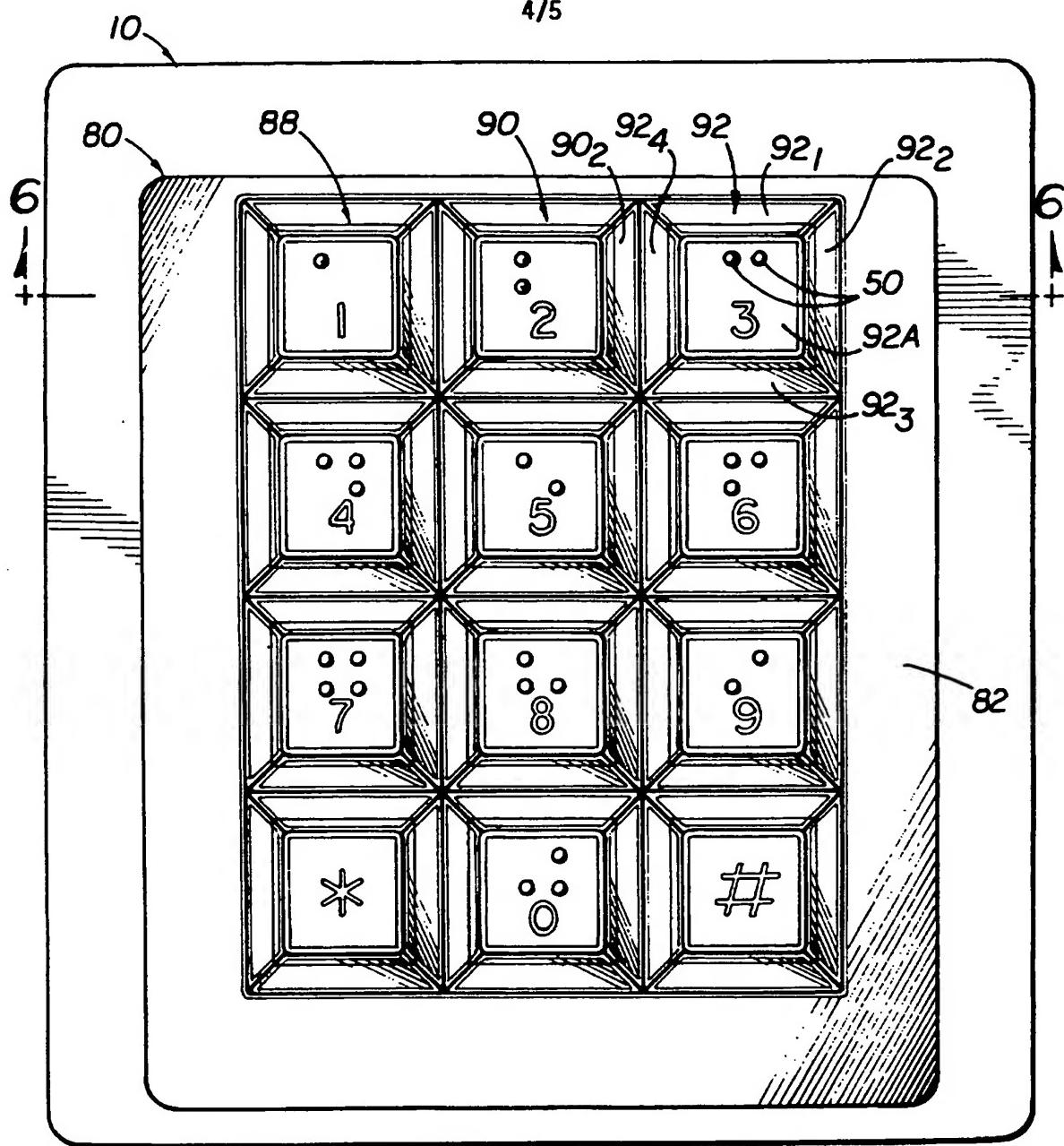


FIG 5

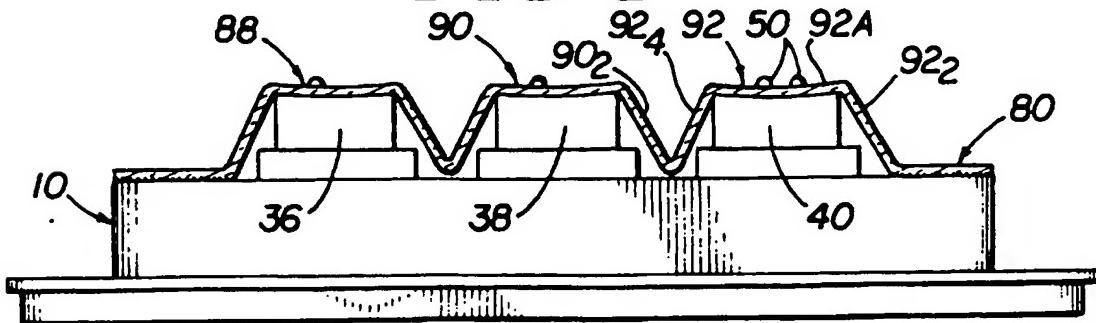
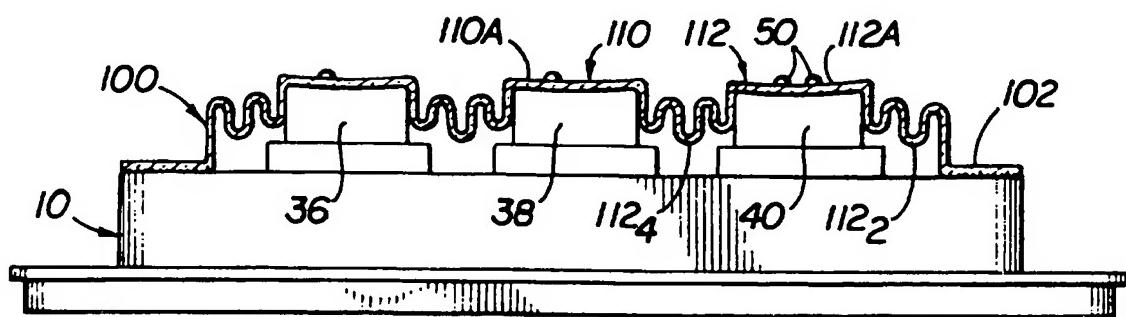
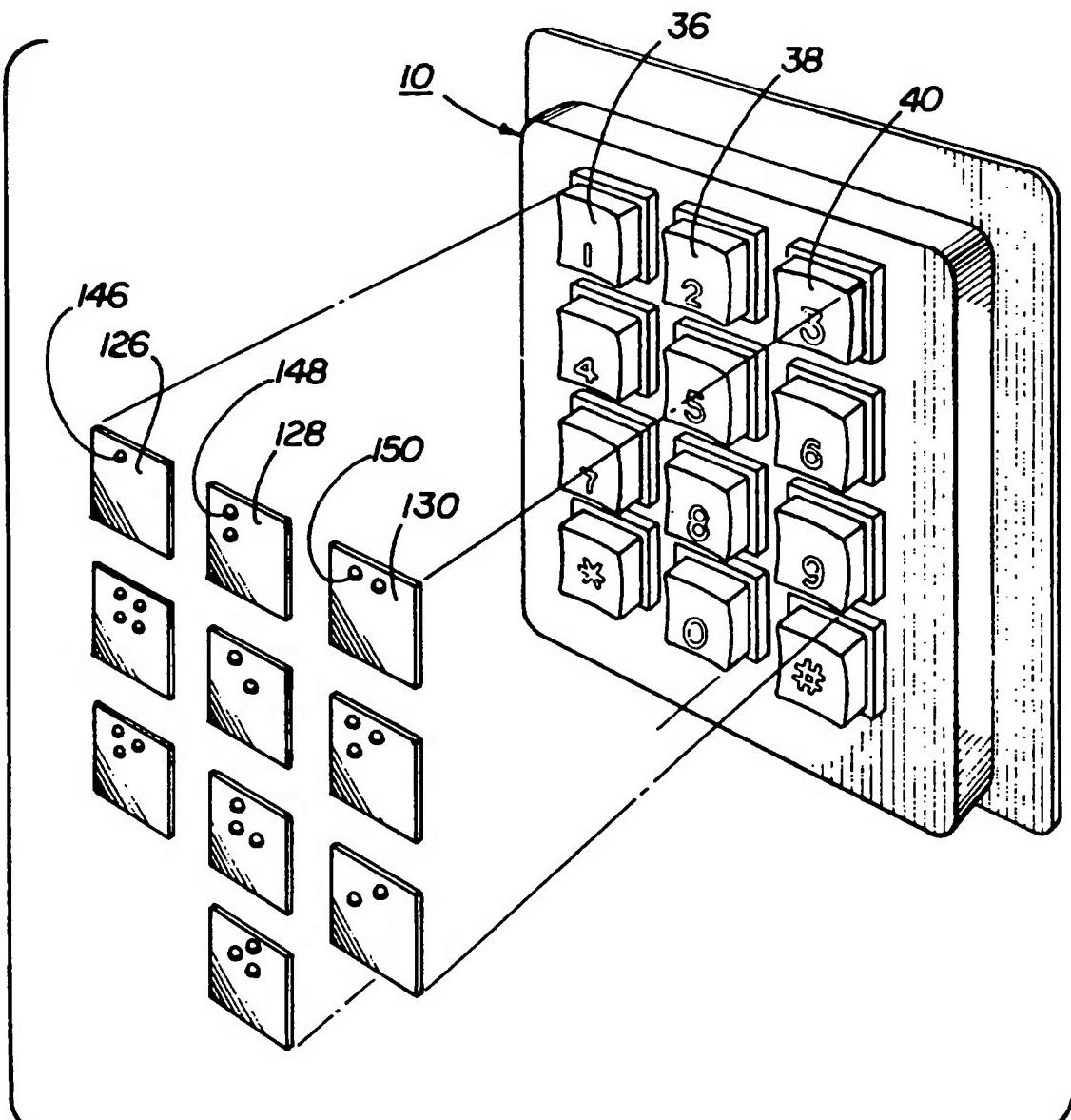


FIG 6

**FIG 7****FIG 8**

INTERNATIONAL SEARCH REPORT

International application No. PCT/US96/02310

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :H04M 11/00; H04Q 3/00; H03K 17/94
US CL : 379/52; 340/825.79; 341/21

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 379/52; 340/825.79; 341/21

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

NONE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US, A, D 280,099 (TOPP) 13 August 1985, Figs. 1-4	1-5, 9-14, 31, 32
---		-----
Y		6-8, 15-30, 33
Y	US, A, 4,616,213 (DANISH) 07 OCTOBER 1986, col. 7, lines 50-65.	6-8, 15-30, 33

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents:	T	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
A document defining the general state of the art which is not considered to be part of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Z"	document member of the same patent family
O document referring to an oral disclosure, use, exhibition or other means		
P document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search

23 APRIL 1996

Date of mailing of the international search report

21 MAY 1996

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